

REMARKS

Applicant concurrently files herewith an excess claim fee for one (1) dependent claim.

Claims 1-21 are all the claims presently pending in the application. Claims 1-4 have been amended. New claims 5-21 have been added to more particularly define the invention. Only Claims 1-2 stand rejected on prior art grounds. Claims 3-4 stand rejected only upon informalities (e.g., 35 U.S.C. § 112, second paragraph) and are presumably allowable upon correction of these informalities. Reconsideration is respectfully requested.

Claims 1-2 stand rejected under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as being obvious over, Yotsuya et al. (JP 06055733A).

These rejections are respectfully traversed in view of the following discussion.

It is noted that the amendments are made only to more particularly define the invention and not for distinguishing the invention over the prior art, for narrowing the scope of the claims, or for any reason related to a statutory requirement for patentability.

It is further noted that, notwithstanding any claim amendments made herein, Applicant's intent is to encompass equivalents of all claim elements, even if amended herein or later during prosecution.

I. THE CLAIMED INVENTION

Applicant's invention, as disclosed and claimed, for example by claim 1 is directed to a method for manufacturing an ink jet recording head.

The method is provided with a pressure generating chamber where the pressure generating chamber is constructed of a first plate, a second plate and a third plate, the first plate is provided with a through-hole and sandwiched between the second plate and the third

plate, the method includes forming a first resist film and a second resist film on a first surface and a second surface of the first plate, respectively, where the first resist film and the second resist film assume substantially a same shape, but are different in length from each other when measured in a direction parallel to a flow direction of ink, and forming the through-hole in the first plate by etching both the first surface and the second surface of the first plate with the use of the first resist film and the second resist film both of which serve as masks in the etching processing of the first plate. (See Page 8, lines 1-6; Page 23, lines 13-23; Page 24, lines 6-17; and Figures 4 and 6).

Conventional methods include forming an ink jet recording head where the pressure generating chamber includes “a through-hole [is so] formed to be straight in a direction perpendicular to the major surfaces of the conventional chamber plate,” i.e., an “inner edge surface extend[s] in a direction perpendicular to an upper or major surface of the chamber plate” thus forming a substantially rectangular shape with substantially square corner portions. However, the ink flow path is “bent at substantially right angles on the midway to reach the ink ejection nozzle.” Thus, this structure causes “stagnation in the ink flow, formation of vapor bubbles, cavitation (which is caused by a large and sudden change in cross-sectional area of the ink flow passage), or like problems occur at corner portions of the pressure generating chamber and also in the vicinities of these corner portions.” (See Page 4, lines 19-29; Page 5, lines 1 - Page 6, line 7; Page 33, lines 6-29; and Figure 8).

An aspect of the inventive method includes the formation of resists so that the first resist film and the second resist film assume substantially a same shape, but are different in length from each other when measured in a direction parallel to a flow direction of ink. This feature provides for “the pressure generating chamber to obtain a relatively smooth inner

wall surface therein by forming a first and a second hole portion, wherein the first and second hole portions communicate with each other to form the pressure generating chamber.” (See Page 7, line 28 - Page 8, line 6; Page 23, lines 13-23; Page 32, lines 1-29; Page 34, lines 12-29; and Figures 4 and 6).

As a result of this inventive method, the ink jet recording head is “free from any problems such as stagnation in the ink flow, formation of vapor, bubbles, cavitation, or like problems occurring in the ink flow in the pressure generating chamber.” Thus, this invention ensures excellent ink ejection operation, a high quality gradation expression in recording operations, and “remarkably lessens an alignment accuracy required in a stacking or assembly operation of its plates or components.” (See Page 8, lines 7-22).

II. 35 U.S.C. § 112, Second Paragraph, Rejection regarding Claims 3-4

Applicant has amended the claims in a manner believed fully responsive to all points raised by the Examiner. In particular, Applicant has amended claims 3 and 4 by changing “first plate” to “one of said second plate and said third plate” to clarify and distinctly point out the subject matter as the ink outlet passage is formed in either the second plate or the third plate. (See MPEP Section 2173.05(b)).

In addition, based on the above amendments, the Applicant traverses the assertion in the Office Action that “forming resist masks on a first and second surface of the first plate . . . are used for the formation of the pressure generating chamber of the ink jet recording head” whereas claims 3 and 4 relate to forming an ink outlet passage in an ink supply plate without these features. The Specification clearly indicates, “a plurality of ink outlet passages arranged into a pair of rows arranged parallel to each other” where “the ink outlet passage is

provided with an upper or first passage portion and a lower or second passage portion each assuming a substantially semispherical shape. As shown in Fig. 4, in construction, the upper or first passage portion is slightly displaced leftward (i.e., in a direction counter to the flow direction I of the ink) relative to the lower or second passage portion.” Accordingly, the claims are supported and consistent with the specification. (See Specification, Page 19, lines 10-16; and Page 25, lines 11-25).

In view of the foregoing, the Examiner is respectfully requested to withdraw these rejections.

III. THE PRIOR ART REJECTIONS

A. The Yotsuya, et al. Reference

Yotsuya, et al. (“Yotsuya”) fails to teach or suggest the features of independent claim 1, including that the first resist film and the second resist film assume substantially a same shape, but are different in length from each other when measured in a direction parallel to a flow direction of ink. (See Page 8, lines 1-6; Page 23, lines 13-23; and Figure 6).

As noted above, in Applicant’s invention (e.g., as defined in Claim 1), the method includes forming a first resist and second resist film where the first resist film and the second resist film assume substantially a same shape, but are different in length from each other when measured in a direction parallel to a flow direction of ink.

In Figures 2-4 of Yotsuya, Yotsuya only teaches a conventional method for forming a conventional ink jet head. This method includes using wet crystal-anisotropy etching where different masks are applied to a silicon wafer and etched to form an “ink pressure room of the penetration slot surrounded by [the] crystal face which appears perpendicularly to a wafer front face.” (See Yotsuya at Constitution; Page 2 of the translation, Paragraphs [0008]-

[0012]; Page 3 of the translation, Paragraphs [0017]-[0030]). The ink pressurized room like the conventional art appears to include a through-hole [is so] formed to be straight in a direction perpendicular to the major surfaces of the conventional chamber plate," i.e., an "inner edge surface extending in a direction perpendicular to an upper or major surface of the chamber plate," thus forming a substantially rectangular shape with substantially square corner portions. Accordingly, the ink flow path appears to be "bent at substantially right angles on the midway to reach the ink ejection nozzle."

In contrast, Applicant's invention teaches forming a through hole in the pressure generating chamber with relatively smooth inner wall surfaces where the first hole portion is displaced sidewardly in a direction parallel to the flow direction of the ink by an amount relative to the second hole portion, by using a first resist and second resist film where the first resist film and the second resist film assume substantially a same shape, but are different in length from each other when measured in a direction parallel to a flow direction of ink. (See Page 7, line 28 - Page 8, line 6; Page 23, lines 13-23; and Figures 4 and 6).

Indeed, Yotsuya is focused on a method of manufacturing an ink jet head, which allows etching to progress on a Si wafer of a field direction where etching-proof mask material is placed all over the Si wafer. Thus, this method forms a configuration where "the ink pressure room of the penetration slot [is] surrounded by the crystal face which appears perpendicularly to a wafer front face," and data is printed with high character density and a superfine image style. (See Yotsuya at Abstract; Page 1, Paragraphs [0003]-[0008]; and Page 2, Paragraphs [0010]-[0014]). Thus, Yotsuya does not teach, disclose or suggest including the first resist film and the second resist film assume substantially a same shape, but are different in length from each other when measured in a direction parallel to a flow direction

of ink. (See Page 8, lines 1-6; Page 23, lines 13-23; Page 24, lines 6-17; and Figures 4 and 6).

Further, please note, that Yotsuya etches on a silicon wafer whereas Applicant forms the resists on a first plate comprised of a metal or a metal alloy, e.g., stainless steel or nickel, for example as recited in new claim 6. (See Page 20, lines 24-28).

Consequently, Yotsuya may provide “stagnation in the ink flow, formation of vapor bubbles, cavitation (which is caused by a large and sudden change in cross-sectional area of the ink flow passage), or like problems occur at corner portions of the pressure generating chamber and also in the vicinities of these corner portions.” (See Page 4, lines 19-29; Page 5, lines 1 - Page 6, line 7; Page 33, lines 6-29; and Figure 8). Accordingly, Yotsuya only discloses a conventional method of manufacturing an ink jet head including wet crystal-anisotropy etching where different masks are applied to a silicon wafer and etched to form an “ink pressure room of the penetration slot surrounded by [the] crystal face which appears perpendicularly to a wafer front face.

In contrast, Applicant’s method forms a through hole in the pressure generating chamber with relatively smooth inner wall surfaces where the first hole portion is displaced sidewardly in a direction parallel to the flow direction of the ink by an amount relative to the second hole portion, by using a first resist and second resist film where the first resist film and the second resist film assume substantially a same shape, but are different in length from each other when measured in a direction parallel to a flow direction of ink as recited in the invention.

Since Yotsuya does not teach, suggest or disclose including the first resist film and the second resist film assume substantially a same shape, but are different in length from each

other when measured in a direction parallel to a flow direction of ink as disclosed in claim 1 of Applicant's invention, Yotsuya is deficient and thus does not teach the specific limitations of dependent claim 2.

For the reasons stated above, the claim invention, and the invention as cited independent claim 1, and related dependent claim 2, are fully patentable over the cited reference.

IV. FORMAL MATTERS AND CONCLUSION

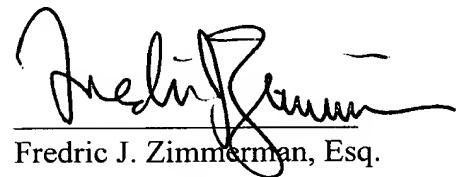
In view of the foregoing, Applicant submits that claims 1-21, all the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

Date: 6/26/03



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